4 Knowledge Management Solutions: Processes and Systems

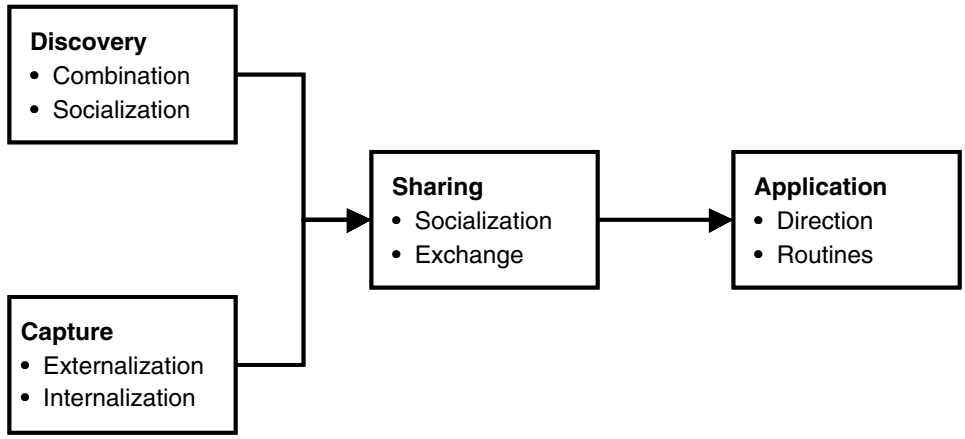
In Chapter 3, we provided an introductory discussion of knowledge management solutions, which refer to the variety of ways in which knowledge management can be facilitated. We indicated that KM solutions include KM processes and KM systems and that KM solutions depend on KM foundations**,** which include KM mechanisms, technologies, and infrastructure. We discussed KM foundations in detail in Chapter 3. This chapter provides a detailed discussion of KM solutions, including KM processes and systems.

The next section describes and illustrates the various processes used to manage knowledge including processes for applying knowledge, processes for capturing knowledge, processes for sharing knowledge, and processes for creating knowledge. In discussing these KM processes, we also examine the seven subprocesses that facilitate them. The discussion of KM processes is followed by a discussion of KM systems, followed by a discussion of the processes for managing KM processes and systems, and then some concluding remarks.

Knowledge Management Processes

We earlier defined knowledge management as *performing the activities involved in discovering, capturing, sharing, and applying knowledge so as to enhance, in a cost-effective fashion, the impact of knowledge on the unit's goal achievement.* Thus, knowledge management relies on four main kinds of KM processes. As shown in Figure 4.1, these include the processes through which knowledge is discovered or captured. It also includes the processes through which this knowledge is shared and applied. These four KM processes are supported by a set of seven KM subprocesses, as shown in Figure 4.1, with one subprocess—socialization—supporting two KM processes (discovery and sharing). Of the seven KM subprocesses, four are based on Nonaka (1994). Focusing on the ways in which knowledge is converted through the interaction between tacit and explicit knowledge, Nonaka identified four ways of managing knowledge: socialization, externalization, internalization, and combination. The other three KM subprocesses—exchange, direction, and routines—are largely based on Grant (1996) and Nahapiet and Ghoshal (1998).

Figure 4.1 **Knowledge Management Processes**



KNOWLEDGE DISCOVERY

Knowledge discovery may be defined as *the development of new tacit or explicit knowledge from data and information or from the synthesis of prior knowledge*. The discovery of new explicit knowledge relies most directly on combination, whereas the discovery of new tacit knowledge relies most directly on socialization. In either case, new knowledge is discovered by synthesizing knowledge from two or more distinct areas with explicit knowledge from two areas being synthesized through combination, and tacit knowledge from two areas being synthesized through socialization. Combination and socialization are discussed now.

Combination

New explicit knowledge is discovered through **combination**, wherein the multiple bodies of explicit knowledge (and/or data and/or information) are synthesized to create new, more complex sets of explicit knowledge (Nonaka 1994). Through communication, integration, and systemization of multiple streams of explicit knowledge, new explicit knowledge is created—either incrementally or radically (Nahapiet and Ghoshal 1998). Existing explicit knowledge, data, and information are reconfigured, recategorized, and recontextualized to produce new explicit knowledge. For example, when creating a new proposal to a client, explicit data, information, and knowledge embedded in prior proposals may be combined into the new proposal. Also, data mining techniques may be used to uncover new relationships amongst explicit data that may be lead to create predictive or categorization models that create new knowledge.

Socialization

In the case of tacit knowledge, the integration of multiple streams for the creation of new knowledge occurs through the mechanism of socialization (Nonaka 1994).

Box 4.1

Knowledge Discovery at Xerox

Julian Orr, who was earlier an anthropologist at Xerox's Palo Alto Research Center (PARC), studied the actions of customer service representatives who fix Xerox machines. One day, he observed a representative working with an especially troublesome machine, which had been recently installed but had never worked properly. Each time the machine failed, it generated a different error message. Following the prescribed process for each particular message, such as adjusting or replacing parts, failed to correct the overall problem. Moreover, the messages did not make sense when considered together.

Frustrated with his inability to fix the troublesome machine, the representative called a specialist, but the specialist also failed to understand why the machine was behaving in this fashion. Subsequently the representative and the specialist spent the afternoon cycling the machine repeatedly, waiting for its crashes and recording its state when it crashed. While doing this, they discussed other incidents of apparently similar problems. "The afternoon resembled a series of alternating improvisational jazz solos, as each man took the lead, ran with it for a little while, then handed it off to the other, this all against the bass-line continuo of the rumbling machine" (Brown and Duguid 2000, p. 78).

During this process, the representative and the specialist gradually brought their different ideas closer together toward a shared understanding of the machine. Finally, late in the day, everything clicked. The erratic behavior of the machine, the experiences of the representative and the specialist, and the stories they both shared eventually formed a single, coherent account. They were able to make sense of the machine and figure out how to fix it. Thus, by bringing very different perspectives and experiences and then sharing them during their conversation—with the problems encountered with the machine providing a common context—they were able to create new knowledge and thereby solve the problem. Very soon, this new solution was passed around for other technicians to use if they faced the same problem.

Source: Compiled from Brown and Duguid 2000.

Socialization is the synthesis of tacit knowledge across individuals, usually through joint activities rather than written or verbal instructions. For example, by transferring ideas and images, apprenticeships help newcomers to see how others think. Davenport and Prusak (1998) described how conversations at the watercooler helped knowledge sharing among groups at IBM. In Box 4.1, we illustrate the knowledge discovery process using the example of Xerox.

KNOWLEDGE CAPTURE

As we discussed in Chapter 2, knowledge can exist within people (individuals or groups), artifacts (practices, technologies, or repositories), and organizational entities (organizational units, organizations, interorganizational networks). Moreover, knowledge could be either explicit or tacit. It might sometimes reside within an individual's mind without that individual being able to recognize it and share it with others. Similarly, knowledge might reside in an explicit form in a manual but few people might be aware of it. It is important to obtain the tacit knowledge from individuals' minds as well as the explicit knowledge from the manual, such that the knowledge can then be shared with others. This is the focus of knowledge

capture, which may be defined as *the process of retrieving either explicit or tacit knowledge that resides within people, artifacts, or organizational entities*. Also, the knowledge being captured might reside outside the organizational boundaries including consultants, competitors, customers, suppliers, and prior employers of the organization's new employees.

The knowledge capture process benefits most directly from two KM subprocesses—externalization and internalization. Based on work by Nonaka (1994), externalization and internalization help capture the tacit knowledge and explicit knowledge, respectively.

Externalization involves converting tacit knowledge into explicit forms such as words, concepts, visuals, or figurative language (e.g., metaphors, analogies, and narratives; Nonaka and Takeuchi 1995). It helps translate individuals' tacit knowledge into explicit forms that can be more easily understood by the rest of their group. This is a difficult process because tacit knowledge is often difficult to articulate. Nonaka (1994) suggested that externalization may be accomplished through the use of metaphor—that is, understanding and experiencing one kind of thing in terms of another. An example of externalization is a consultant team writing a document that describes the lessons the team has learned about the client organization, client executives, and approaches that work in such an assignment. This captures the tacit knowledge acquired by the team members.

Internalization is the conversion of explicit knowledge into tacit knowledge. It represents the traditional notion of **learning**. The explicit knowledge may be embodied in action and practice so that the individual acquiring the knowledge can re-experience what others have gone through. Alternatively, individuals could acquire tacit knowledge in virtual situations, either vicariously by reading manuals or others' stories or experientially through simulations or experiments (Nonaka and Takeuchi 1995). An example of internalization is a new software consultant reading a book on innovative software development and learning from it. This learning helps the consultant, and her organization, capture the knowledge contained in the book.

Box 4.2 provides an illustration of knowledge capture.

KNOWLEDGE SHARING

Knowledge sharing is the process through which explicit or tacit knowledge is communicated to other individuals. Three important clarifications are in order. First, knowledge sharing means effective transfer, so that the recipient of knowledge can understand it well enough to act on it (Jensen and Meckling 1996). Second, what is shared is knowledge rather than recommendations based on the knowledge; the former involves the recipient acquiring the shared knowledge as well as being able to take action based on it, whereas the latter (which is direction, discussed in the next section) simply involves utilization of knowledge without the recipient internalizing the shared knowledge. Third, knowledge sharing may take place across individuals as well as across groups, departments, or organizations (Alavi and Leidner 2001).

If knowledge exists at a location that is different from where it is needed, either knowledge sharing or knowledge utilization without sharing (discussed in the next

Box 4.2

Knowledge Capture at Viant

Viant, the Boston-based company that we discussed in Box 3.4, uses a variety of means to capture knowledge. It employs a number of simple but unavoidable forms. Before every project, consultants are required to complete a *quicksheet* describing the knowledge they will need, what aspects of knowledge can be leveraged from prior projects, and what they will need to create along with the lessons they hope to learn that they can share with others later. A longer report, a sunset review, is produced at a team meeting to document what worked and what did not work well. Forgetting these reports is hard due to several reasons: "First, almost every document ends up on Viant's internal Web site, hot-linked every which way. Second, sunset reviews are done with a facilitator who wasn't on the team, which helps keep them honest. Third, every six weeks Newell's knowledge management group prepares, posts, and pushes a summary of what's been learned."

Source: Stewart 2000.

section) is necessary. Sharing knowledge is clearly an important process in enhancing organizational innovativeness and performance. This is reflected in the fact it was one of the three business processes for which General Electric Company CEO Jack Welch took personal responsibility (the others were allocation of resources and development of people) (Stewart 2000).

Depending on whether explicit or tacit knowledge is being shared, exchange or socialization processes are used. Socialization, which we have discussed above, facilitates the sharing of tacit knowledge in cases in which new tacit knowledge is being created as well as when new tacit knowledge is not being created. There is no intrinsic difference between the socialization process when used for knowledge discovery or knowledge sharing, although the way in which the process may be used could be different. For example, when used to share knowledge, a face-to-face meeting (a mechanism that facilitates socialization) could involve a question-and-answer session between the sender and recipient of knowledge, whereas when used to create knowledge a face-to-face meeting could take more the form of a debate or joint problem-solving, as seen in Box 4.1.

Exchange, in contrast to socialization, focuses on the sharing of explicit knowledge. It is used to communicate or transfer explicit knowledge among individuals, groups, and organizations (Grant 1996). In its basic nature, the process of exchange of explicit knowledge does not differ from the process through which information is communicated. An example of exchange is a product design manual being transferred by one employee to another, who can then use the explicit knowledge contained in the manual. Exchanging a document could also be used to transfer information.

Box 4.3 provides an illustration of knowledge sharing.

KNOWLEDGE APPLICATION

Knowledge application is the process through which knowledge is utilized within the organization to make decisions and perform tasks, thereby contributing to organiza-

Box 4.3

Knowledge Sharing at the Veteran's Health Administration

Until 1997, the Veteran's Health Administration (VHA) did not have any systematic mechanism to enable its 219,000 employees to share their informal knowledge, innovations, and best practices. To address this need and also to serve as a place where any VHA employee can access knowledge capital of colleagues, the VHA Lessons Learned Project and its Web site, the Virtual Learning Center (VLC), were initiated in 1997. The VHA indicates that a major reason for initiating this project was a recognized need to transform the organization into a learning organization. In 1999, the VLC became available on the Internet. The site now has international participation from Korea, Canada, Spain, Pakistan, and elsewhere. By reducing red tape, cutting across organizational silos, partnering and benchmarking with others, and establishing best processing, the VHA is "saving countless hours of staff time by not having to reinvent the wheel at its 173 medical centers, more than 600 clinics, 31 nursing home care units, 206 counseling centers, and other federal and private healthcare institutions, Veterans Benefits and National Cemetery offices."

Source: Compiled from U.S. Department of Veterans Affairs, http://www.va.gov.

tional performance. Of course, the process of knowledge application depends on the available knowledge, and knowledge itself depends on the processes of knowledge discovery, capture, and sharing, as shown in Figure 4.1. The better the processes of knowledge discovery, capture, and sharing, the greater the likelihood that the knowledge needed is available for effective application in decision-making and task performance.

In applying knowledge, the party that makes use of it does not necessarily need to comprehend it. All that is needed is that somehow the knowledge be used to guide decisions and actions. Therefore, knowledge utilization benefits from two processes—routines and direction—that do not involve the actual transfer or exchange of knowledge between the concerned individuals but only the transfer of the recommendations that is applicable in a specific context (Grant 1996).

Direction refers to the process through which the individual possessing the knowledge directs the action of another individual without transferring to that individual the knowledge underlying the direction. Direction involves the transfer of instructions or decisions and not the transfer of the knowledge required to make those decisions, and hence it has been labeled as *knowledge substitution* (Conner and Prahalad 1996). This preserves the advantages of specialization and avoids the difficulties inherent in the transfer of tacit knowledge. Direction is the process used when a production worker calls an expert to ask her how to solve a particular problem with a machine and then proceeds to solve the problem based on the instructions given by the expert. He does this without himself acquiring the knowledge so that if a similar problem reoccurs in the future, he would be unable to identify it as such and would therefore be unable to solve it himself without calling an expert. Similarly a student taking a test who asks his fellow classmate for the answer to a question gets a direction (which of course could be wrong), and no knowledge is effectively shared between the two, which means the next time the student faces that question, posed perhaps

in a slightly different form, he will not be able to discern the right answer. Note the difference between direction and socialization or exchange, where the knowledge is actually transferred to the other person in either tacit form (socialization) or explicit form (exchange).

Routines involve the utilization of knowledge embedded in procedures, rules, and norms that guide future behavior. Routines economize on communication more than directions as they are embedded in procedures or technologies. However, they take time to develop, relying on "constant repetition" (Grant 1996). Routines could be automated through the use of IT, such as in systems that provide help desk agents, field engineers, consultants, and customer endusers with specific and automated answers from a knowledge base (Sabherwal and Sabherwal, 2007). Similarly, an inventory management system utilizes considerable knowledge about the relationship between demand and supply, but neither the knowledge nor the directions are communicated through individuals. Also, enterprise systems are coded with routines that describe business process within industry segments.

Next, we examine KM systems that utilize KM mechanisms and technologies to support the KM processes. In this discussion, we also identify the roles of several specific KM technologies in enabling KM systems.

KNOWLEDGE MANAGEMENT SYSTEMS

Knowledge management systems are the integration of technologies and mechanisms that are developed to support the four KM processes. Knowledge management systems utilize a variety of KM mechanisms and technologies, discussed before, to support the KM processes discussed in Chapter 3. Each KM system utilizes a combination of multiple mechanisms and multiple technologies. Moreover, the same KM mechanism or technology could, under differing circumstances, support multiple KM systems.

Depending on the KM process most directly supported, KM systems can be classified into four kinds, which are discussed in detail in Part II: knowledge application systems (Chapter 6), knowledge capture systems (Chapter 7), knowledge sharing systems (Chapter 8), and knowledge discovery systems (Chapter 9). Here we provide a brief overview of these four kinds of systems and examine how they benefit from KM mechanisms and technologies.

KNOWLEDGE DISCOVERY SYSTEMS

As discussed in Chapter 3, knowledge discovery systems support the process of developing new tacit or explicit knowledge from data and information or from the synthesis of prior knowledge. These systems support two KM subprocesses associated with knowledge discovery: combination, enabling the discovery of new explicit knowledge; and socialization, enabling the discovery of new tacit knowledge.

Thus, mechanisms and technologies can support knowledge discovery systems by facilitating combination and/or socialization. Mechanisms that facilitate combination include collaborative problem solving, joint decision-making, and collaborative creation of documents. For example, at the senior-management level, new explicit

knowledge is created by sharing documents and information related to midrange concepts (e.g., product concepts) augmented with grand concepts (e.g., corporate vision) to produce new knowledge about both areas. This newly created knowledge could be, for example, a better understanding of products and a corporate vision (Nonaka and Takeuchi 1995). Mechanisms that facilitate socialization include apprenticeships, employee rotation across areas, conferences, brainstorming retreats, cooperative projects across departments, and initiation process for new employees. For example, Honda Motor Company, Ltd., "set up 'brainstorming camps' (*tama dashi kai*)—informal meetings for detailed discussions to solve difficult problems in development projects" (Nonaka and Takeuchi 1995, p. 63).

Technologies facilitating combination include knowledge discovery systems (see Chapter 9), databases, and Web-based access to data. According to Nonaka and Takeuchi (1995), "reconfiguration of existing information through sorting, adding, combining, and categorizing of explicit knowledge (as conducted in computer databases) can lead to new knowledge" (p. 67). Repositories of information, **best practice** databases, and lessons learned systems (see Chapter 8) also facilitate combination. Technologies can also facilitate socialization, albeit to a lesser extent than they can facilitate combination. Some of the technologies for facilitating socialization include videoconferencing and electronic support for communities of practice (see Chapter 10).

KNOWLEDGE CAPTURE SYSTEMS

Knowledge capture systems support the process of retrieving either explicit or tacit knowledge that resides within people, artifacts, or organizational entities. These systems can help capture knowledge that resides within or outside organizational boundaries including within consultants, competitors, customers, suppliers, and prior employers of the organization's new employees. Knowledge capture systems rely on mechanisms and technologies that support externalization and internalization.

KM mechanisms can enable knowledge capture by facilitating externalization—that is, the conversion of tacit knowledge into explicit form; or internalization—that is, the conversion of explicit knowledge into tacit form. The development of models or prototypes and the articulation of best practices or lessons learned are some examples of mechanisms that enable externalization. Box 4.2, presented earlier, illustrates the use of externalization to capture knowledge about projects in one organization.

Learning by doing, on-the-job training, learning by observation, and face-to-face meetings are some of the mechanisms that facilitate internalization. For example, at one firm, "the product divisions also frequently send their new-product development people to the Answer Center to chat with the telephone operators or the 12 specialists, thereby 're-experiencing' their experiences" (Nonaka and Takeuchi 1995, p. 69).

Technologies can also support knowledge capture systems by facilitating externalization and internalization. Externalization through **knowledge engineering**, which involves integrating knowledge into information systems to solve complex problems that normally require considerable human expertise" (Feigenbaum and McCorduck 1983), is necessary for the implementation of intelligent technologies such as expert systems, case-based reasoning systems (see Chapter 6), and knowledge capture systems (see

Chapter 7). Technologies that facilitate internalization include computer-based training and communication technologies. Using such communication facilities, an individual can internalize knowledge from a message or attachment thereof sent by another expert, an AI-based knowledge capture system, or computer-based simulation.

KNOWLEDGE SHARING SYSTEMS

Knowledge sharing systems support the process through which explicit or tacit knowledge is communicated to other individuals. They do so by supporting exchange (i.e., sharing of explicit knowledge) and socialization (which promotes sharing of tacit knowledge).

Mechanisms and technologies that were discussed as supporting socialization also play an important role in knowledge sharing systems. Discussion groups or chat groups facilitate knowledge sharing by enabling an individual to explain her knowledge to the rest of the group. In addition, knowledge sharing systems also utilize mechanisms and technologies that facilitate exchange. Some of the mechanisms that facilitate exchange are memos, manuals, progress reports, letters, and presentations. Technologies facilitating exchange include groupware and other team-collaboration mechanisms; Web-based access to data and databases; and repositories of information, including best practice databases, lessons learned systems, and expertise locator systems. Box 4.3 on the Veteran's Health Administration (VHA), which was presented earlier, provides one illustration of the importance of knowledge sharing.

KNOWLEDGE APPLICATION SYSTEMS

Knowledge application systems support the process through which some individuals utilize knowledge possessed by other individuals without actually acquiring, or learning, that knowledge. Mechanisms and technologies support knowledge application systems by facilitating routines and direction.

Mechanisms facilitating direction include traditional hierarchical relationships in organizations, help desks, and support centers. On the other hand, mechanisms supporting routines include organizational policies, work practices, organizational procedures, and standards. In the case of both direction and routines, these mechanisms may be either within an organization (e.g., organizational procedures) or across organizations (e.g., industry best practices).

Technologies supporting direction include experts' knowledge embedded in expert systems (see Chapter 8) and decision-support systems, as well as troubleshooting systems based on the use of technologies like case-based reasoning. On the other hand, some of the technologies that facilitate routines are expert systems (see Chapter 6), enterprise resource planning systems, and traditional management information systems. As mentioned for KM mechanisms, these technologies can also facilitate directions and routines within or across organizations. These are discussed in detail in Chapter 6.

Box 4.4 provides an illustration of a knowledge application. Moreover, Box 4.5 provides an illustration of KM technologies.

Table 4.1 summarizes the discussion of KM processes and KM systems, and also indicates some of the mechanisms and technologies that might facilitate them. As

Box 4.4

Automated Knowledge Application at DeepGreen Financial

Based in Cleveland, Ohio, DeepGreen Financial (which was acquired in March 2004 by Lightyear Capital, a New York-based private equity investment firm) has revolutionized the mortgage industry by providing low-rate, home equity products that are easy to apply for and obtain over the Internet. DeepGreen even offers to close the loan at the borrower's home. DeepGreen's efficient and innovative technology has reduced the cost of loan production, which they pass on to the consumer. An Internet-only home equity lender, DeepGreen originates loans in 47 states and makes them available through its Web site and through partners such as LendingTree, LLC, Priceline, and Costco Wholesale Corporation. DeepGreen originates home equity products at five times the industry average in terms of dollars per employee.

Right from its start in August 2000, DeepGreen has been based on efficient knowledge utilization. Right from the firm's creation, the vision for it was to rely on automated decision technology. DeepGreen created an Internet-based system that makes credit decisions within minutes by selecting the customers with the best credit. Efficient knowledge utilization through routines embedded as rules within an automated system, along with efficient use of online information, enabled only eight employees to process about 400 applications daily. Instead of competing on the basis of interest rates, DeepGreen competed in terms of ease of application (a customer could complete the application within five minutes) and by providing nearly instantaneous, unconditional decisions without requiring the borrowers to provide the usual appraisals or paperwork upfront. This quick decision is enabled through knowledge application and the computation of credit score and property valuation using online data. In about 80 percent of the cases, a final decision is provided to the customer within two minutes of the application being completed. *Online Banking Report* named DeepGreen's home equity lines of credit as the "Best of the Web."

Source: Compiled from Davenport and Harris 2005; Harris and Brooks 2004; http://www.home-equity-info.us/lenders_banks_deepgreen-bank.php; and http://www.deepgreenfinancial.com/.

Box 4.5

KM Technologies at Cisco

Cisco Systems Inc., utilizes Directory 3.0, which is its internal Facebook, in which the employee listings are designed to identify the employee's expertise area and promote collaboration. To further promote knowledge sharing, it utilizes a variety of technologies including: Ciscopedia, which is an internal document site; C-Vision, which is Cisco's version of YouTube; and the Idea Zone, which is a wiki for employees to post and discuss business ideas. Cisco has also been developing a companywide social computing platform to enable knowledge creation and sharing through strengthening of existing networks and facilitation of new connections (Fitzgerald 2008). According to Cisco's VP, Communication and Collaboration IT: "We are always looking for the applications that help people really have water-cooler talk, something that we thought was impossible in a global business" (McGirt 2008).

Cisco's CIO remarked in 2008 (Fitzgerald 2008): "CIOs need to consider issues of privacy, data security, and the ability to scale across a global organization. It's no good, if 15 different business units develop 15 different online communities that can't talk to each other."

Sources: E. McGirt. "How Cisco's CEO John Chambers Is Turning the Tech Giant Socialist," FastCompany, December 1, 2008, http://www.fastcompany.com/1093654/how-ciscos-ceo-john-chambers-turning-tech-giant-socialist. M. Fitzgerald, "Why Social Computing Aids Knowledge Management," CIO, June 13, 2008, http://www.cio.com/article/2435683/enterprise-software/why-social-computing-aids-knowledge-management.html.

Table 4.1

KM Processes and Systems, and Associated Mechanisms and Technologies

KM Processes	KM Systems	KM Subprocesses	Illustrative KM Mechanisms	Illustrative KM Technologies
Knowledge Discovery	Knowledge Discovery Systems	Combination	Meetings, telephone conversations, documents, and collaborative creation of documents	Databases, Web-based access to data, data mining, repositories of information, Web portals, best practices, and lessons learned
		Socialization	Employee rotation across departments, conferences, brainstorming retreats, cooperative projects, initiation	Video-conferencing, electronic discussion groups, and e-mail
Knowledge Capture	Knowledge Capture Systems	Externalization	Models, prototypes, best practices, lessons learned	Expert systems, chat groups, best practices, and lessons learned databases
		Internalization	Learning by doing, on-the-job training, learning by observation, and face-to-face meetings	Computer-based communication, AI-based knowledge acquisition, and computer-based simulations
Knowledge Sharing	Knowledge Sharing Systems	Socialization	See above	See above
		Exchange	Memos, manuals, letters, and presentations	Team collaboration tools, Web-based access to data, databases, and repositories of information, best practices databases, lessons learned systems, and expertise locator systems
Knowledge Application	Knowledge Application Systems	Direction	Traditional hierarchical relationships in organizations, help desks, and support centers	Capture and transfer of experts' knowledge, troubleshooting systems, and case-based reasoning systems; decision support systems
		Routines	Organizational policies, work practices, and standards	Expert systems, enterprise resource planning systems, and management information systems

may be seen from this table, the same tool or technology can be used to support more than one KM process.

MANAGING KNOWLEDGE MANAGEMENT SOLUTIONS

The management of KM systems will be discussed in Chapters 6 through 9, which will examine each of the four types of KM systems in greater detail. Moreover, the selection of KM processes and KM systems that would be most appropriate for the circumstances will be discussed in Chapter 11. Finally, the overall leadership of the KM function will be discussed in Chapter 12. Therefore, in this section, we focus on some overall recommendations regarding the management of KM processes and systems.

First, organizations should use a combination of the four types of **KM processes** and systems. Although different KM processes may be most appropriate in the light of the organization's business strategy, focusing exclusively on one type of KM processes (and the corresponding type of KM systems) would be inappropriate because they serve complementary objectives. More specifically, it is important to note the following:

- Knowledge application enables efficiency. However, too much emphasis on knowledge application could reduce knowledge creation, which often benefits from individuals viewing the same problem from multiple different perspectives and thereby leads to reduced effectiveness and innovation.
- Knowledge capture enables knowledge to be converted from tacit form to explicit, or from explicit form to tacit, and thereby facilitates knowledge sharing. However, it might lead to reduced attention to knowledge creation. Moreover, knowledge capture could lead to some knowledge being lost in the conversion process; not all tacit knowledge is converted into explicit form during externalization, and not all explicit knowledge is converted into tacit form during internalization.
- Knowledge sharing enables efficiency by reducing redundancy. However, too much knowledge sharing could lead to knowledge leaking from the organization and becoming available to competitors, and consequently reduce the benefits to the focal organization.
- Knowledge discovery enables innovation. However, too much emphasis on knowledge discovery could lead to reduced efficiency. It is not always suitable to create new knowledge, just as it may not always be appropriate to reuse existing knowledge.

Second, each KM process could benefit from two different subprocesses, as depicted in Figure 4.1. The subprocesses are mutually complementary, and should be used depending on the circumstances as discussed in Chapter 11. For example, knowledge sharing could occur through socialization or exchange. If knowledge being shared is tacit in nature, socialization would be appropriate, whereas if knowledge being shared is explicit in nature, exchange would be suitable. However, when individuals need to share both tacit and explicit knowledge, the two subprocesses (socialization and exchange) could be integrated together, such as in a face-to-face meeting (i.e.,

using socialization to transfer tacit knowledge) where the participants are also sharing printed reports containing explicit knowledge (i.e., using exchange to transfer explicit knowledge). Overall, the seven KM subprocesses should be developed within a group such that they can complement each other in an efficient fashion.

Third, each of the seven KM subprocesses of the KM processes depends on the KM mechanisms and technologies, as discussed before. Moreover, the same mechanism could be used to support multiple different subprocesses. Development and acquisition of these mechanisms and technologies, respectively, should be done in the light of the KM processes that would be most appropriate for the organizational circumstances.

Finally, the KM processes and systems should be considered in the light of each other, so that the organization builds a portfolio of mutually complementary KM processes and systems over time. This requires involvement from senior executives, a long-term KM strategy for the organization, and an understanding of the synergies as well as common foundations (i.e., mechanisms and technologies that might support multiple KM systems and processes) across the various KM systems and processes.

Alignment Between Knowledge Management and Business Strategy

Alignment between business strategy and knowledge management helps enhance organizational performance (Kaplan and Norton 2004). Greater alignment between a firm's business strategy and its KM efforts indicates that these efforts are targeted on areas that are critical to the firm's success. For knowledge to become a source of competitive advantage, firms need to match their learning and knowledge strategy with their business strategy.

When a firm's learning and knowledge strategy matches its business strategy, the impact of knowledge and learning is positive. If this match is not achieved, knowledge and learning may have no impact or even have a negative impact on performance (Vera and Crossan 2004).

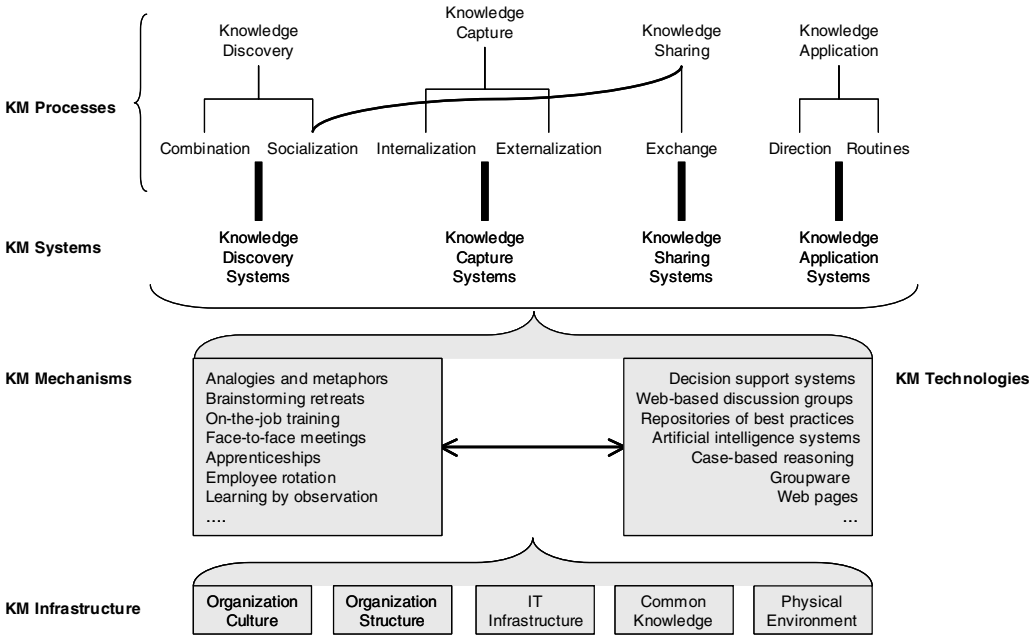
Summary

Building on the discussion of knowledge management foundations in Chapter 3, we have examined KM solutions, including KM processes and systems, in this chapter. Figure 4.2 provides a summary of the various aspects of knowledge management, indicating the various aspects of KM processes (including the four overall processes as well as the seven specific processes that support them), KM systems, KM mechanisms and technologies, and KM infrastructure. The next chapter examines the value of knowledge and KM solutions, highlighting their importance for organizational performance.

Review

1. Give an example of one knowledge management mechanism that could be used to facilitate each of the four knowledge management processes.

Figure 4.2 **A Detailed View of Knowledge Management Solutions**



2. Give an example of one knowledge management technology that could be used to facilitate each of the four knowledge management processes.
3. Briefly explain the four kinds of classifications for knowledge management systems based on the process supported.
4. Distinguish between direction and routines. How do they relate to knowledge substitution?
5. Socialization could be used for knowledge discovery as well as knowledge sharing. Would the underlying process be any different depending on whether it is being used for knowledge discovery or knowledge sharing?
6. How does knowledge management relate to business strategy?
7. What effect does alignment between knowledge management and business strategy have on organizational performance?
8. Tacit knowledge could be transferred from one person to another in two distinct ways. One possibility is to transfer it directly through socialization. The other possibility is to convert it into explicit form (through externalization), then transfer it in explicit form to the recipient (through exchange), who then converts it into tacit form (through internalization). What are the pros and cons of each approach? If the purpose is to transfer knowledge from one person to one other person, which approach would you recommend? If the purpose is to transfer knowledge from one person to 100 other individuals in different parts of the world, which approach would you recommend? Why?

APPLICATION EXERCISES

1. How would you, as a CEO of a manufacturing firm, facilitate the growth of knowledge management practices within your organization?
2. How would you utilize knowledge discovery systems and knowledge capture systems in an organization that is spread across the globe? Does geographic distance hamper the utilization of these systems?
3. Suggest reasons why a knowledge sharing system could be established between rival organizations (e.g., Mastercard Inc. and Visa Inc.) for the mutual benefit of both organizations.
4. Critique the following statement: "We have implemented several IT solutions: expert systems, chat groups, and best practices/lessons learned databases. These powerful solutions will surely induce our employees to internalize knowledge."
5. Consider the organization where you currently work or one with which you are familiar (either through your own prior experience or through interactions with someone who works there). What kind of knowledge management systems and processes does this organization use to manage knowledge? What are their effects on this organization's performance? In what order did the organization develop these KM systems and processes, and why?
6. Interview at least three managers from local organizations that have recently implemented a knowledge management system. How do these organizations differ in terms of the KM systems they have developed? What reasons led these organizations to develop these systems?

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